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Two new species of salamanders (Caudata: Plethodontidae) of the genera *Bolitoglossa* and *Nototriton* from Parque Nacional La Muralla, Honduras

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Abstract.—Two new species of salamanders of the genera *Bolitoglossa* and *Nototriton* are described from the isolated cloud forests of Parque Nacional La Muralla, Honduras. The *Bolitoglossa* is a member of the *B. dunni* group and differs from all other group members by having well-defined yellow spots on the lateral surfaces of the body. The *Nototriton* appears to be most closely related to *N. barbouri* and can be distinguished from that species by its shorter tail and smaller size.

Parque Nacional La Muralla, in the northwestern portion of Departamento de Olancho, Honduras, is herpetologically one of the best known national parks in Honduras (Espinal et al. 1997). Espinal et al. (1997) included some recently collected salamanders from the park under the name *Nototriton "barbouri."* Subsequent study of these salamanders demonstrated that they were likely an undescribed species related to *N. barbouri.* Thus, in July 1996, we returned to Parque Nacional La Muralla hoping to collect additional specimens of these salamanders. About mid-day on 29 July, we set up a camp at 1430 m elev. at the nearest known source of drinking water to the *Nototriton* locality. As the *Nototriton* locality was still a four hour walk from camp, we decided to collect that afternoon and night in the environs of our campsite and go to the *Nototriton* locality the following day. Unexpectedly, we discovered a brillantly colored undescribed species of *Bolitoglossa* around the campsite. The following day we made a successful visit to the previously known *Nototriton* locality. Study of this new material confirmed the distinctness of the Muralla *Nototriton.* We herein provide a formal description of each of these two salamanders.

Methods and Material

All measurements were made to the nearest 0.1 mm with dial calipers under a dissecting microscope. Abbreviations used are SVL (snout to posterior end of vent), HL (head length; snout to gular fold), HW (head width), TL (tail length), HLL (hind limb length), FLL (forelimb length), CLL (combined forelimb and hind limb lengths), HFW (hind foot width), and NL (nostril length). For ease of comparison, the format for the 'Description' and 'Measurements of the holotype' sections for the *Bolitoglossa* follow that of McCranie & Cruz (1996), whereas those sections for the *Nototriton* follow the format of McCranie & Wilson (1997). The numbers in parentheses in the color in life descriptions refer to the color codes in Smithe (1975). McCranie & Cruz (1996) listed the adult material of the *Bolitoglossa dunni* group recently examined and McCranie & Wilson (1997) listed all material of *Nototriton* recently examined. The following specimens of *Nototriton barbouri* were re-examined for this study: AMNH 54949; USNM 339700–12. Additionally, a recently collected specimen of *N. barbouri* (USNM 497552: Depto. Atlántida, Honduras) was compared to the new

Fig. 1. Adult female holotype of *Bolitoglossa decora* (USNM 500000), SVL 62.1 mm.

species of *Nototriton* (thus a total of 27 specimens of *N. barbouri* have been examined).

Systematics

Bolitoglossa decora, new species
Fig. 1

Holotype.—National Museum of Natural History, USNM 500000, an adult female from along the trail to Cerro de Enmedio near the Monte Escondido campground (15°05′N, 86°44′W), Parque Nacional La Muralla, 1440 m elev., Departamento de Olancho, Honduras, collected 29 Jul 1996 by D. Almendarez, J. R. McCranie, and L. D. Wilson. Original number LDW 11032.

Paratypes.—USNM 497534, an adult female, USNM 497533, 497535, both apparently immature males, all from the same hillside as the holotype, 1440–1550 m elev.

Referred specimens.—USNM 497536–38, all subadult females, all from the same hillside as the holotype, 1430–1500 m elev.

Diagnosis.—*Bolitoglossa decora* is a member of the *B. dunni* group as defined by Elias (1984). *Bolitoglossa decora* can be distinguished from all other members of the group—*B. carri* McCranie & Wilson, *B. celaque* McCranie & Wilson, *B. conanti* McCranie & Wilson, *B. cuchumatana* (Stuart), *B. dunni* (Schmidt), *B. engelhardti* (Schmidt), *B. helmrichi* (Schmidt), *B. longissima* McCranie & Cruz, *B. porrasorum* McCranie & Wilson, and *B. rostrata* (Brocchi)—by having well-defined Buff-Yellow (in life) or pale yellow (after a short time in preservative) spots on the lateral surface of the body. Individuals of some of the above mentioned species may have pale flecks on the lateral surfaces or pale dorsolateral stripes, but not well-defined pale spots laterally. Additionally, *B. decora* has less webbing (two to slightly over two phalanges on both sides of digit III on both forelimbs and hind limbs free of webbing) than all of the above named species except for *B. longissima, B. rostrata,* and some specimens of *B. celaque* (see table 1 in McCranie & Cruz 1996, for a comparison to the remaining Honduran members of the *B. dunni* group). *Bolitoglossa decora* also has shorter limbs than *B. longissima* (male HLL/SVL 24.9–26.4%, $\bar{X}$ = 25.7 versus 31.9% in one male *longissima*; female

HLL/SVL 24.1–25.3%, $\bar{X}$ = 24.7 versus 31.0–31.9%, $\bar{X}$ = 31.6 in *longissima*).

Description.—Relatively large (SVL 36.5–40.2, $\bar{X}$ = 38.4 in two apparently immature males; 61.0–62.1, $\bar{X}$ = 61.6 in two adult females) member of *B. dunni* group; snout nearly truncate to broadly rounded in dorsal aspect, broadly rounded in profile; females more robust than relatively slender males; labial protuberances well developed in males, weakly developed in females; mental gland very weakly developed in largest male, mental gland not evident in smaller male; head relatively narrow (HW/SVL 15.7–16.4%, $\bar{X}$ = 16.1 in two males; 16.1–16.3%, $\bar{X}$ = 16.2 in two females); eyes slightly protuberant, not or only barely visible beyond margin of jaw when viewed from below in both sexes; postorbital groove shallow, extending posteriorly from eye before turning sharply ventrally to connect with gular fold, another groove proceeding sharply ventrally just posterior to mandible and extending irregularly across throat anterior to gular fold; sublingual fold absent; maxillary teeth moderately abundant (47–54, $\bar{X}$ = 50.5 in two males; 68–70, $\bar{X}$ = 69.0 in two females), extending beyond level of center of eye; vomerine teeth abundant (23–31, $\bar{X}$ = 27.0 in two males; 29–31, $\bar{X}$ = 30.0 in two females), in long, single or slightly irregular, arched series extending slightly beyond level of medial border of choanae; premaxillary teeth (2 in both males; 5–6, $\bar{X}$ = 5.5 in two females) enlarged, piercing lip or located just posterior to lip in males, not enlarged, located posterior to lip in females; tail laterally compressed, constricted basally; tail relatively short (TL/SVL 74.9% in one male; 75.7–77.0%, $\bar{X}$ = 76.4 in two females); limbs slender, long, adpressed forelimb and hind limb slightly overlapping to limb interval of 1/2 costal fold in two males, limb interval 1/2–1 costal fold in two females (HLL/SVL 24.9–26.4%, $\bar{X}$ = 25.7 in two males; 24.1–25.3%, $\bar{X}$ = 24.7 in two females); webbing reduced, with two to slightly over two phalanges on both sides of digit III on both forelimbs and hind limbs free of webbing; digit tips bluntly rounded, bearing well-developed subdigital pads; relative length of digits on forelimbs I<IV≈II<III, those on hind limbs I<V<II<IV<III.

Color in life was recorded as follows for the adult female holotype (USNM 500000): middorsal region of back and top of head Amber (36), this color grading laterally to Burnt Umber (22); lateral surface of body with variously-sized prominent Buff-Yellow (53) spots; dorsal surface of tail Burnt Umber (22) with Warm Buff (118) spots; dorsal surfaces of limbs Warm Buff (118) with Buff-Yellow (53) spots and Burnt Umber (22) crossbars; side of head Raw Umber (23) with Buff-Yellow (53) spots; all ventral surfaces Drab (27) with Buff-Yellow (53) spots; iris mottled gold and rust color. A subadult female (USNM 497536) was colored as follows: dorsal surfaces of body and tail Fuscous (21) with slightly paler middorsal line of irregular markings; top of head Russet (34); lateral surfaces of body Fuscous (21) with row of Buff-Yellow (53) spots; dorsal surfaces of limbs Amber (36) with darker smudging; all ventral surfaces Drab (27) with very few scattered Buff-Yellow (53) spots on chin and chest; iris mottled gold and rust color.

Color in preservative: dorsum of body dark brown, sometimes with paler brown middorsal region; top of head usually paler brown than body ground color; lateral surfaces of body dark brown with pale yellow spots of varying sizes, ranging from small and few in number to numerous and large in size; most specimens also have small to moderately large pale yellow spots on dorsal and lateral surfaces of tail; dorsal surfaces of limbs usually with pale brown spots covering at least the knee region; ventral surfaces of body and tail vary from cream-colored with numerous tiny brown flecks to dark brown with numerous tiny pale iridophores, some specimens also have numerous large pale spots on ventral and subcaudal surfaces; large females have

more numerous and larger pale spots on lateral surfaces of body and tail, on dorsal surfaces of tail and limbs, and on all ventral and subcaudal surfaces.

Measurements of holotype.—HW 10.1; HL 15.5; head depth at posterior angle of jaw 4.7; eyelid length 3.7; eyelid width 2.7; anterior rim of orbit to snout 4.1; horizontal orbital diameter 1.7; interorbital distance 3.3; distance between vomerine teeth and parasphenoid tooth patch 0.2; snout to forelimb 8.5; distance separating choanae 2.5; distance separating external nares 2.3; snout projection beyond mandible 1.0; SVL 62.1; body length 46.6; snout to anterior angle of vent 56.0; axilla to groin 28.9; TL 47.0; tail width at base 4.0; tail depth at base 3.9; right FFL 14.6; right HLL 15.7; right forefoot width 5.4; right HFW 6.4.

Natural history notes.—*Bolitoglossa decora* is known from 1430 to 1550 m in the Lower Montane Wet Forest formation of Holdridge (1967). One specimen was lying exposed among leaves in the trail during the day. At least one member of our party had stepped on, and possibly uncovered the individual prior to its discovery. The remaining specimens were collected at night from vegetation 1 to 2 m above the ground. Most of these were taken from fronds of a small palm. Another specimen was collected on the stalk of a small bamboo. Two newly hatched juveniles, that were not retained, were exposed at night on a bamboo leaf and on an arboreal bromeliad lying on the ground.

Etymology.—The specific name *decora* (pronounced with emphasis on first syllable) is an adjective formed from the Latin word *decorus,—a,—um* (ornamented, elegant, or beautiful). The name alludes to the spectacularly ornamented and beautiful color pattern of the large females of this taxon.

Nototriton lignicola, new species
Fig. 2

Holotype.—National Museum of Natural History, USNM 497539, an adult male from Cerro de Enmedio (15°06′N, 86°44′W) along the trail above the Monte Escondido campground, Parque Nacional La Muralla, 1780 m elev., Departamento de Olancho, Honduras, collected 30 Jul 1996 by D. Almendarez, J. R. McCranie, and L. D. Wilson. Original number LDW 11036.

Paratypes.—USNM 497540–43, 497546–47, all adult males, USNM 497544–45, 497548, all adult females, all from within ca. 0.5 airline km of the locality for the holotype, 1760–1780 m elev.

Referred specimens.—USNM 497549–51, all subadults from within ca. 0.5 airline km of the locality for the holotype, 1760–1770 m elev.

Diagnosis.—*Nototriton lignicola* is most similar morphologically to *N. barbouri* (Schmidt) of the *N. nasalis* group (see Papenfuss & Wake 1987). *Nototriton lignicola* differs from *N. barbouri* by having a shorter tail (adult male TL/SVL 0.898–1.059, $\bar{X}$ = 0.987 versus 1.191–1.398, $\bar{X}$ = 1.295 in *barbouri*; adult female TL/SVL 0.840–1.006, $\bar{X}$ = 0.935 versus 1.031–1.146, $\bar{X}$ = 1.088 in *barbouri*; also, all three subadult *N. lignicola* have TL/SVL ratios of ≤1.0) and smaller adult size (male SVL 28.3–33.9, $\bar{X}$ = 31.1 versus 35.6–38.3, $\bar{X}$ = 37.0 in *barbouri*; female SVL 31.0–32.8, $\bar{X}$ = 31.7 versus 30.2–39.9, $\bar{X}$ = 35.3 in *barbouri*). *Nototriton lignicola* is most easily distinguished from the remaining species placed in the *N. nasalis* group by McCranie & Wilson (1997) and Papenfuss & Wake (1987)—*N. alvarezdeltoroi* Papenfuss & Wake, *N. nasalis* (Dunn), *N. sanctibarbarus* McCranie & Wilson, and *N. veraepacis* (Lynch & Wake)—by having much smaller nostrils (NL/SVL 0.006–0.009 versus 0.017–0.029).

Description.—The seven adult males and three adult females in the type series, respectively, have the following measurements and proportions (means in parentheses): SVL 28.3–33.9 (31.1), 31.0–32.8 (31.7); HL/SVL 0.180–0.194 (0.186), 0.177–0.183 (0.181); HW/SVL 0.104–0.118 (0.113), 0.103–0.112 (0.108);

Fig. 2. Adult male paratype of *Nototriton lignicola* (USNM 497540), SVL 28.3 mm.

TL/SVL 0.898–1.059 (0.987, n = 6), 0.840–1.006 (0.935); HLL/SVL 0.163–0.181 (0.171), 0.158–0.163 (0.160); FLL/SVL 0.151–0.160 (0.156), 0.137–0.151 (0.144); CLL/SVL 0.314–0.340 (0.327), 0.296–0.314 (0.304); HFW/SVL 0.029–0.040 (0.035), 0.032–0.037 (0.034); NL/SVL 0.006–0.009 (0.007), 0.006 in all three females.

Snout broadly rounded to nearly truncate in dorsal aspect, broadly rounded to nearly vertical in profile; nostrils small; labial protuberances well developed in males, weakly developed in females; males with rather indistinct oval-shaped mental gland; eyes somewhat protuberant, narrowly visible to not visible beyond margin of jaw when viewed from below; postorbital groove shallow, extending posteriorly from eye before turning sharply ventrally to connect with gular fold, another groove proceeding sharply ventrally just posterior to mandible; head weakly demarcated from trunk; parotoid glands indistinct or absent; sublingual fold present; maxillary teeth 46–50 (48.3, n = 6) in males, 52–54 (53.3) in females, extending to level beyond center of orbit; vomerine teeth 16–20 (18.3, n = 6) in males, 16–24 (20.0) in females, in long, single, arched series extending to level well beyond outer edge of choanae; premaxillary teeth 4–5 (4.4) in males, 6 in all three females, slightly enlarged, located just posterior to lip and slightly offset from maxillary series in males, not enlarged, located posterior to lip and in line with maxillary series in females; costal grooves 13; tail laterally compressed, slightly constricted basally; limbs slender, short, limb interval four to five costal folds in males, five costal folds in females; digits differentiated, with about one phalanx of digit III between digits II–III on forelimbs free of webbing, and about two phalanges of digit III between digits III–IV on hind limbs free of webbing; digit tips bluntly rounded, bearing well-developed subdigital pads; relative length of digits on forelimbs I<IV<II<III, those on hind limbs I<V<II<IV<III; postilliac glands fairly distinct to indistinct; males with cloacal papillae, females with shallow cloacal folds.

Coloration in life was recorded as follows for the adult male holotype (USNM

497539): all dorsal surfaces Burnt Umber (22) with Buff (24) and white flecking visible to unaided eye; all ventral surfaces Hair Brown (119A) with scattered white flecks visible to unaided eye; iris rust red with copper spots. Another adult male (USNM 497540) was colored as follows: all dorsal surfaces Burnt Umber (22) except middorsum of body slightly paler; all dorsal surfaces with scattered white flecks visible to unaided eye; all ventral surfaces Hair Brown (119A); iris copper.

Color in preservative: all dorsal surfaces medium brown to dark brown with numerous pale colored iridophores, iridophores frequently joined to one another; ventral and subcaudal surfaces paler than dorsal surfaces as result of more numerous joined pale iridophores.

Measurements of holotype.—HW 3.9; head depth at posterior angle of jaw 2.2; eyelid length 1.9; eyelid width 1.1; anterior rim of orbit to snout 1.3; interorbital distance 1.1; snout to forelimb 9.3; NL 0.2; distance between external nares 0.8; projection of snout beyond mandible 0.1; HL 6.0; SVL 33.1; snout to anterior angle of vent 30.5; axillary to groin 18.0; TL 32.5; tail depth at base 2.0; tail width at base 2.0; FLL 5.0; forefoot width 0.7; HLL 5.4; HFW 1.0; length of digit III on hind foot 0.8; length of digit V on hind foot 0.3.

Natural history notes.—Nototriton lignicola is known from 1760 to 1780 m in the Lower Montane Wet Forest formation of Holdridge (1967). All specimens were taken from inside rotten logs. Six specimens were taken from inside one log on 14 September 1995. Three other individuals were also found inside this same log when it was revisited on 30 July 1996. Also on 30 July 1996, four specimens of *N. lignicola* and two of *Oedipina cyclocauda* were collected from inside a single rotten log.

Etymology.—The specific name *lignicola* is used as a noun in apposition formed from the Latin words *lignum* (wood) and *cola* (an inhabitant). The name refers to the microhabitat of this species as all known specimens were collected from inside rotten logs.

Discussion

Relationships among the species of the *B. dunni* (or *B. rostrata*) group are poorly understood (McCranie & Cruz 1996). *Bolitoglossa decora* occurs in an isolated mountain range about 55 km SSE of and 80 km NNW of the nearest known populations for other members of the *B. dunni* group (*B. porrasorum* and *B. longissima,* respectively). The reduced webbing in *B. decora* most closely resembles that of *B. longissima* among the Honduran species of the *dunni* group. However, *B. longissima* has essentially unpatterned dorsal and lateral surfaces and longer limbs. In recent years, we have collected tail tips (stored in 95% ETOH in the MVZ collection) from three of the Honduran species placed in the *B. dunni* group (*conanti, decora,* and *porrasorum*). An effort will be made to collect tail tips from the remaining Honduran species of the group as well. It is hoped that DNA analysis of this material will be forthcoming and will elucidate the ingroup relationships of these species that are not currently determinable with the diversity of morphological characteristics demonstrated by these species.

Nototriton lignicola appears to be most closely related to *N. barbouri.* These two species have similarly-sized nostrils that are considerably smaller than those of the remaining species placed in the *N. nasalis* group by McCranie & Wilson (1997) and Papenfuss & Wake (1987). *Nototriton barbouri* also can be found inside rotten logs like *N. lignicola. Nototriton lignicola* occurs in an isolated mountain range about 55 km SSE of and 70 km E of the two nearest known *N. barbouri* localities (Atlántida: Cerro Búfalo; Yoro: Montaña Macuzal; respectively). Tail tips of both *N. barbouri* and *N. lignicola* are also on deposit in the MVZ collection.

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